Crossbreeding dairy cattle

Technology introduction and impacts on tropical smallholder production systems

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why crossbreeding in the tropics?

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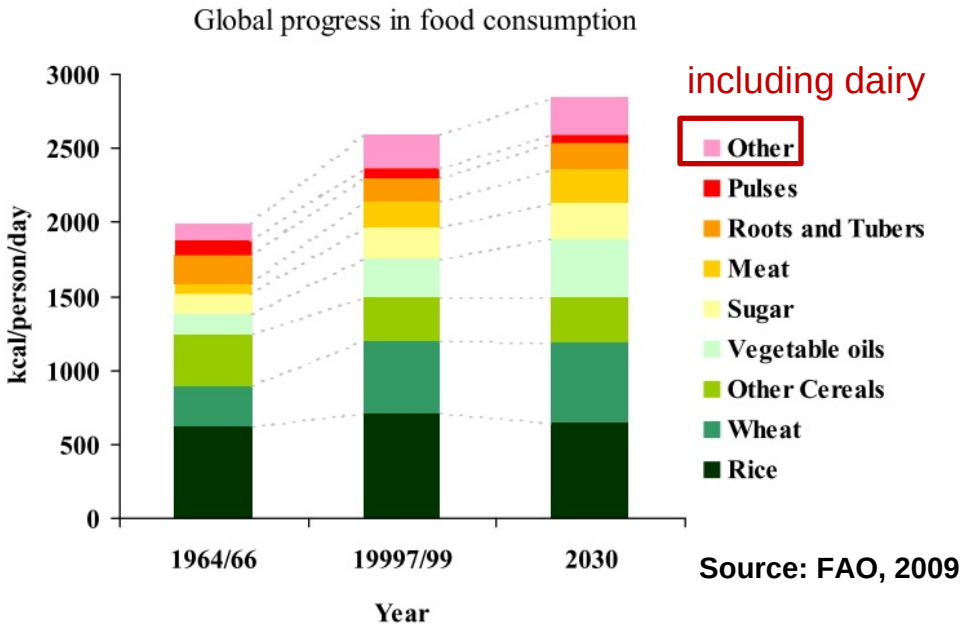
- dairy production = livelihood resource-poor (Mekonnen et al., 2009)
- population growth (FAO, 2009)
- changing consumption patterns (FAO, 2009)



Source: FAO, 2009

why crossbreeding in the tropics?

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- local breeds productivity = major constraint

TABLE 1. Means for native breeds, their first cross herdmates, 3/4 crosses, and pure European breeds and deviations from herdmates (%).

Breed group	No. breeds	Age 1st calving	Milk yield	Days in milk	Calving interval
		(mo)	(kg)		(days)
		Performance			
Native	15	43.1	894	244	444
Two-breed cross	57	33.8	1903	316	437
3/4 cross	26	44.5	2072	288	454
European	7	36.5	2426	312	460
Two-breed cross	21	34.3	2108	285	415

McDowell 1985

- indigenous x exotic dairy breeds:
  - desirable traits → local breeds (e.g. Willham, 1970)

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advantages crossbreds

+ ‘ income
+ employment
+ ‘ household nutrition (e.g. Nicholson et al., 1999)
+ integration agro-industry (e.g. Holloway et al., 2001)
+ ‘ lifetime production (e.g. Singh, 2005)
+ ‘ productivity/animal (e.g. Samdup et al., 2010)
+ income opportunities (women) (e.g.Tiplida and Kristjanson, 2008)
+ livelihood improvement (e.g. Peacock et al., 2011)

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disadvantages crossbreds

- “ endemic disease and climatic tolerance (e.g. Wilson, 2009)
- ‘ feed demand (e.g.Tassew and Seifu, 2009)
- management (e.g. Wilson, 2009)
- ‘ animal health care (e.g. de Haan, 1995)
- ‘ workload (women) (e.g.Tiplida and Kristjanson, 2008)
- high initial investment (e.g.Holloway et al., 2001)
- threat local AnGR (e.g. Wollny et al., 2002)

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crossbreeding = sustainable improvement?

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- crossbreeding encouraged (governments, NGOs)
- slow up-take rate
  - few programs successful (de Haan, 1995),
  - widely used but often unsustainable (Kosgey et al., 2006)
- situation **after introduction** on smallholder farms?

knowledge gap about adaptation of crossbreeding at farm level

Our research wanted to identify...

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- crossbreeding introduction
- motivations & challenges
- crossbreeding adaptation
- perceptions of crossbred performance
- impacts

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at <u>farm level</u>

study site and context - Ethiopia

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Amhara

2000m a.s.l.

11-30°C ; 1200-1500mm

rain-fed highland temperate mixed farming

crossbreeding context:

government extension program (heifer multiplication & distribution), 122 farms

Holstein Friesian dominant

partner:

Amhara Regional Agricultural Research Institute (ARARI)

study site and context - Uganda

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Ankole

1500m a.s.l.

17-30°C; 1000-1500 mm

rain-fed pastoral/banana-coffee system

crossbreeding context:

farmer driven; 65 farms

Holstein Friesian dominant

partner:

National Animal Genetic Resource Center and Data Bank (NAGRC&DB)

study site and context - India

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Maharashtra

520m a.s.l.

9-41°C; 1000-1500 mm

(dry) rain-fed mixed farming system

crossbreeding context:

NGO driven (livestock program), 61 farms

Holstein Friesian dominant

partner:

BAIF Development Research Foundation

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data collection and analysis

- 248 farmer interviews
- respondents:
  - resident farmers
  - household head/spouse
  - at least 8 years crossbreeding
  - local dairy cattle before
  - gender
- Statistical Analytical Software (SAS Institute Inc., 2010)
  - Procedure frequency

selected results – crossbreeding information

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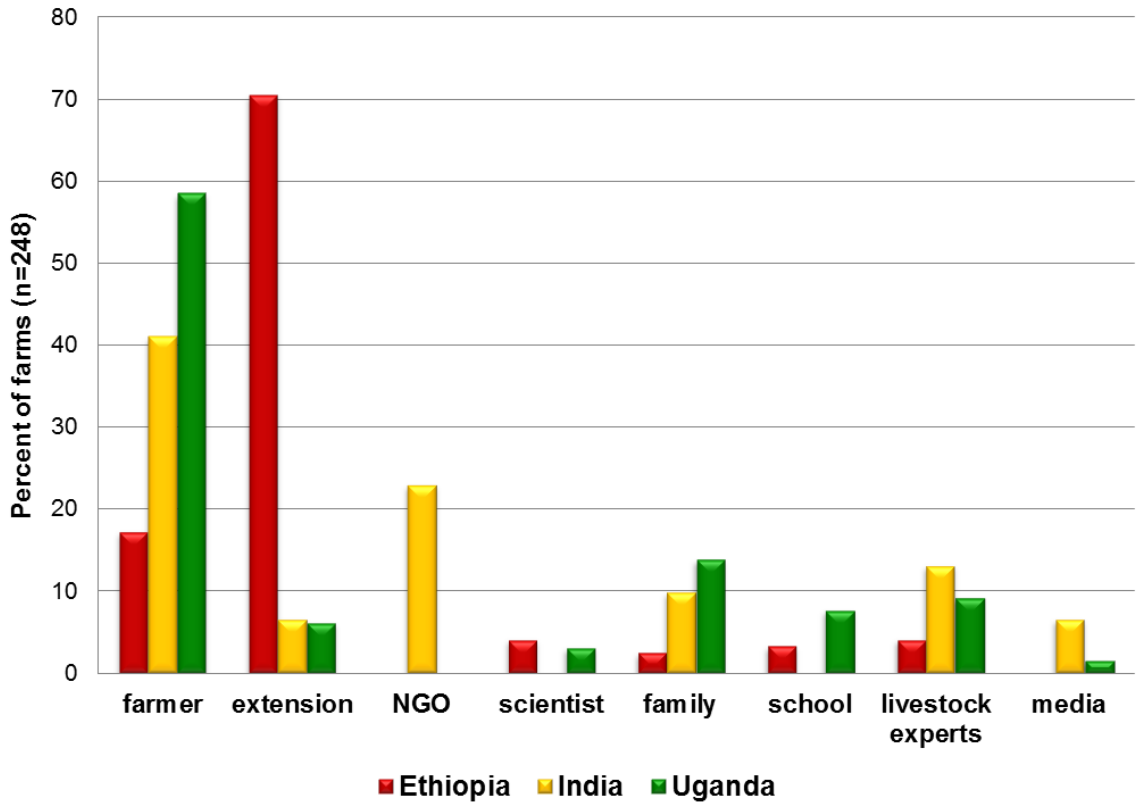


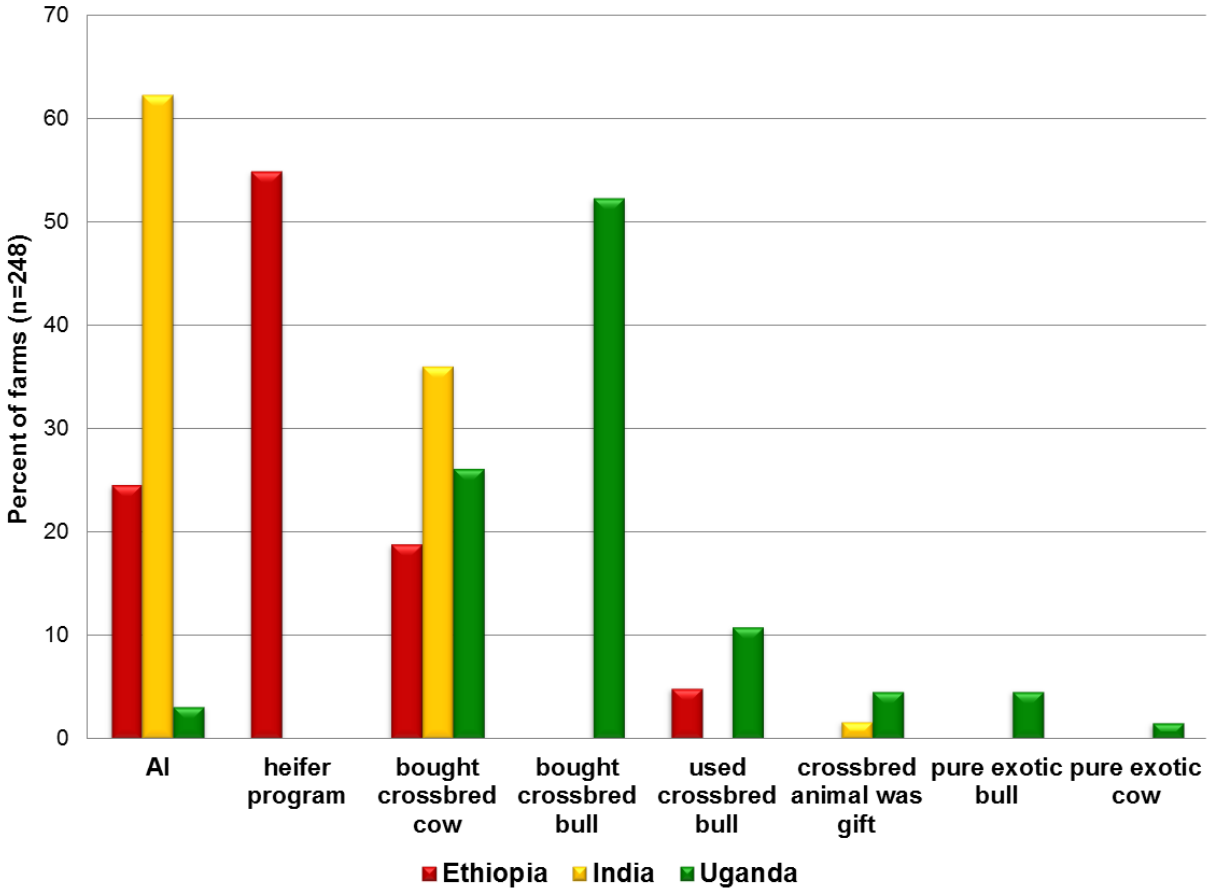
additional information:

- farmers
- veterinarians

motivation:

- income
- higher milk yield
- better potential crossbreds
- others advice

selected results – crossbred animal source



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selected results – adaptation breeding strategy

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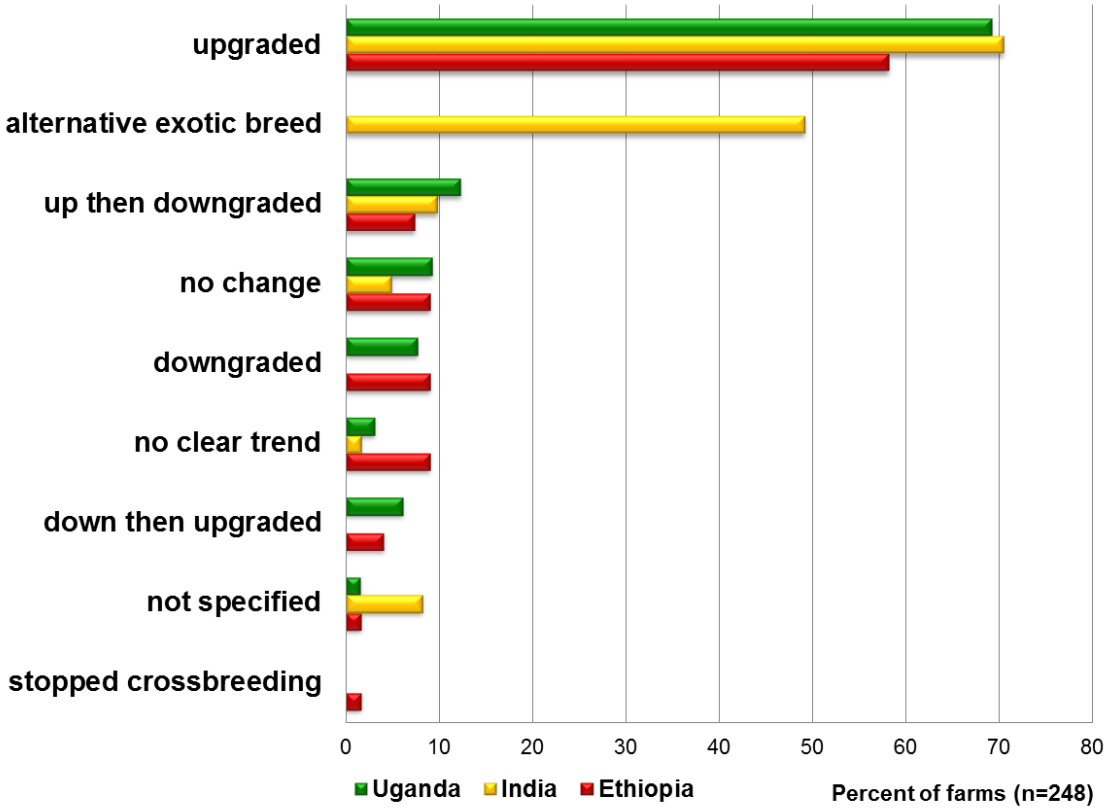
initial crossbred level:

- 50% exotic blood

initial exotic breeds:

- Holstein Friesian (dominant)
- Jersey



selected results – adaptation breeding strategy

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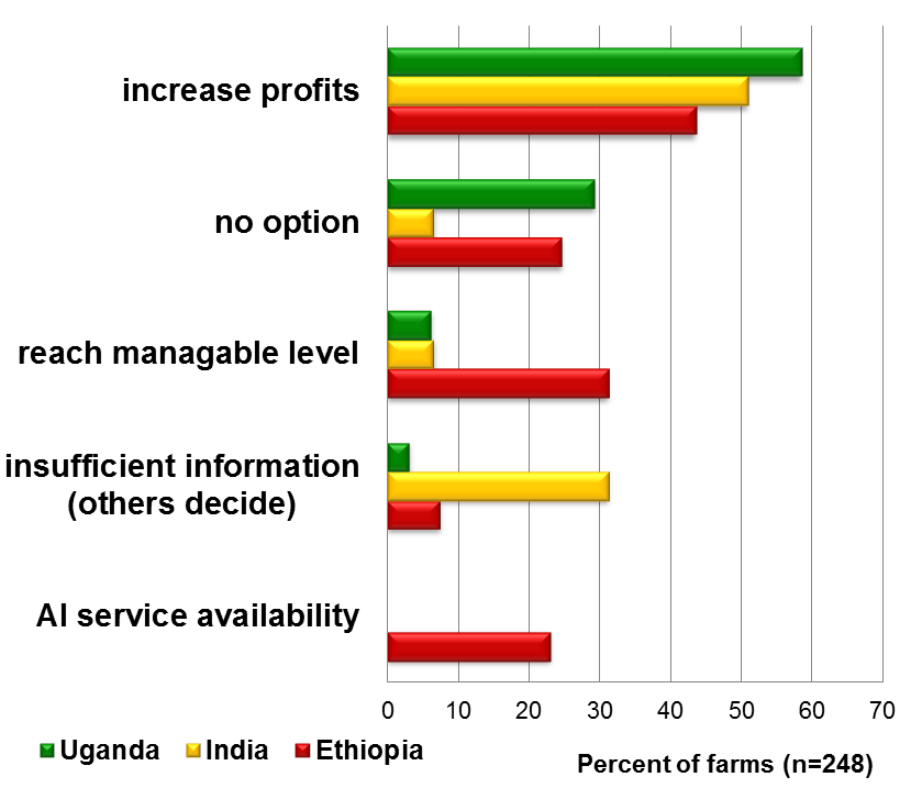
Why have you changed your crossbreeding practice?	percent farmers* (n=248)
increase profits	49
no option	21
reach managable level	19
lack of information (others decide)	12
AI service availability	11
high levels problematic	8
no change	8
not specified	6
alternative breed qualities	5
breeding problems	4
used own offspring bull	2
trust bullkeeper	1
natural crisis	0

* multiple answers possible



selected results – perception crossbred cow performance

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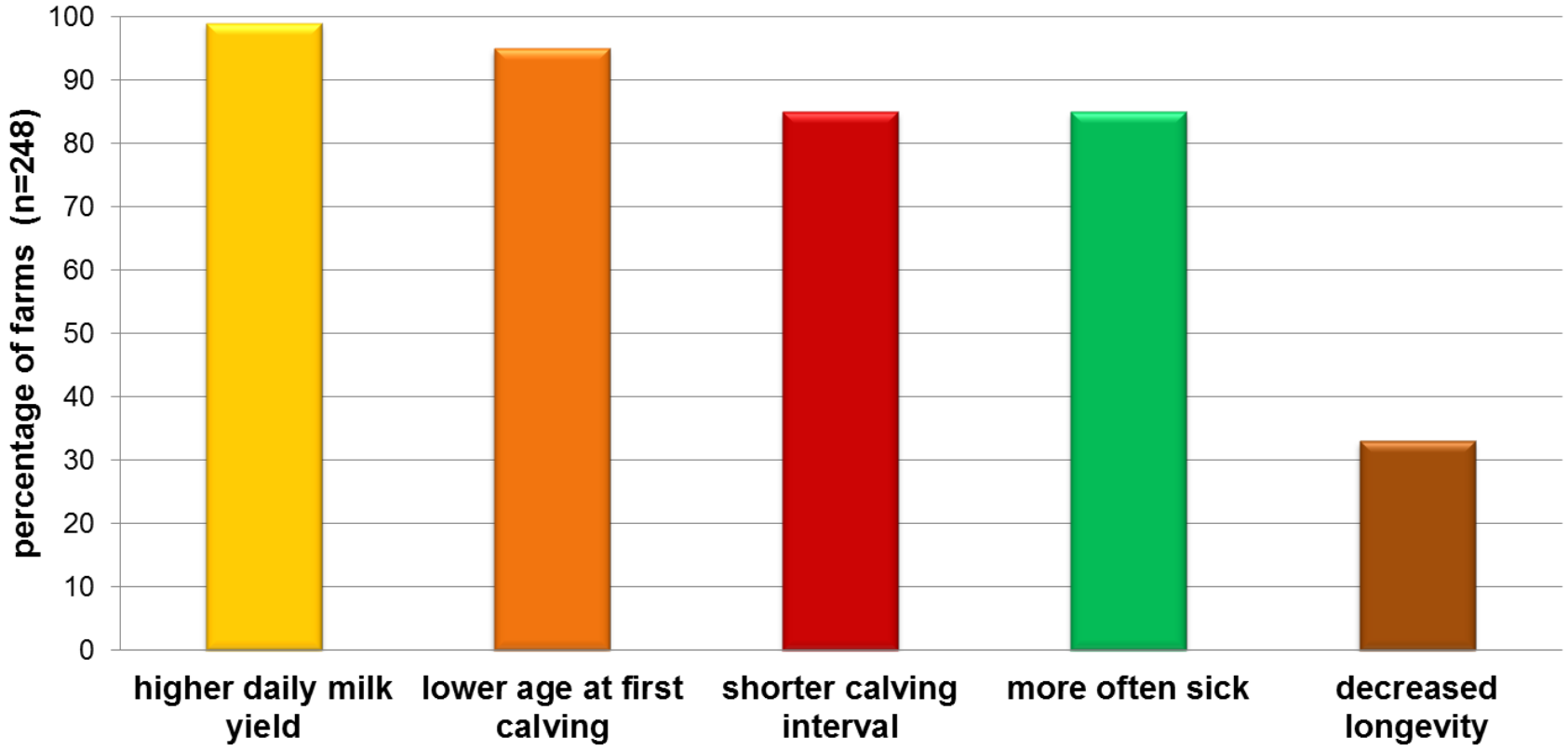

selected results – impacts production system

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more income
(98%)

new structures
(95%)

increase workload
(94%)

selected results – impacts production system

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herd size change
(91%)

new feedstuffs
(84%)

new markets
(84%)

selected results – impacts production system

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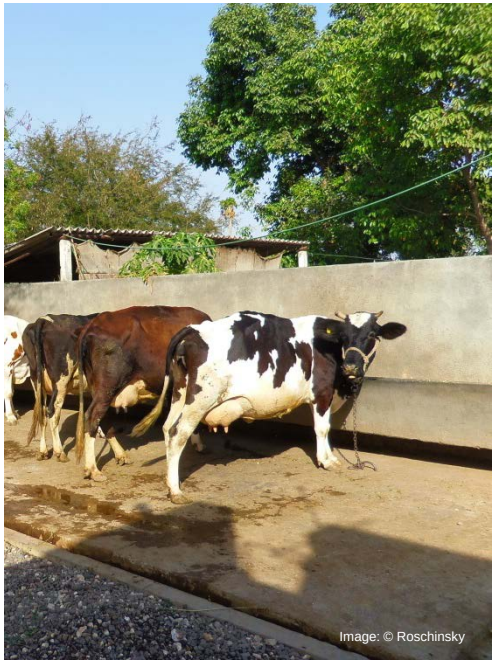
increased vet demand
(73%)

new grazing management
(71%)



more workers
(48%)

selected results – crossbreeding challenges

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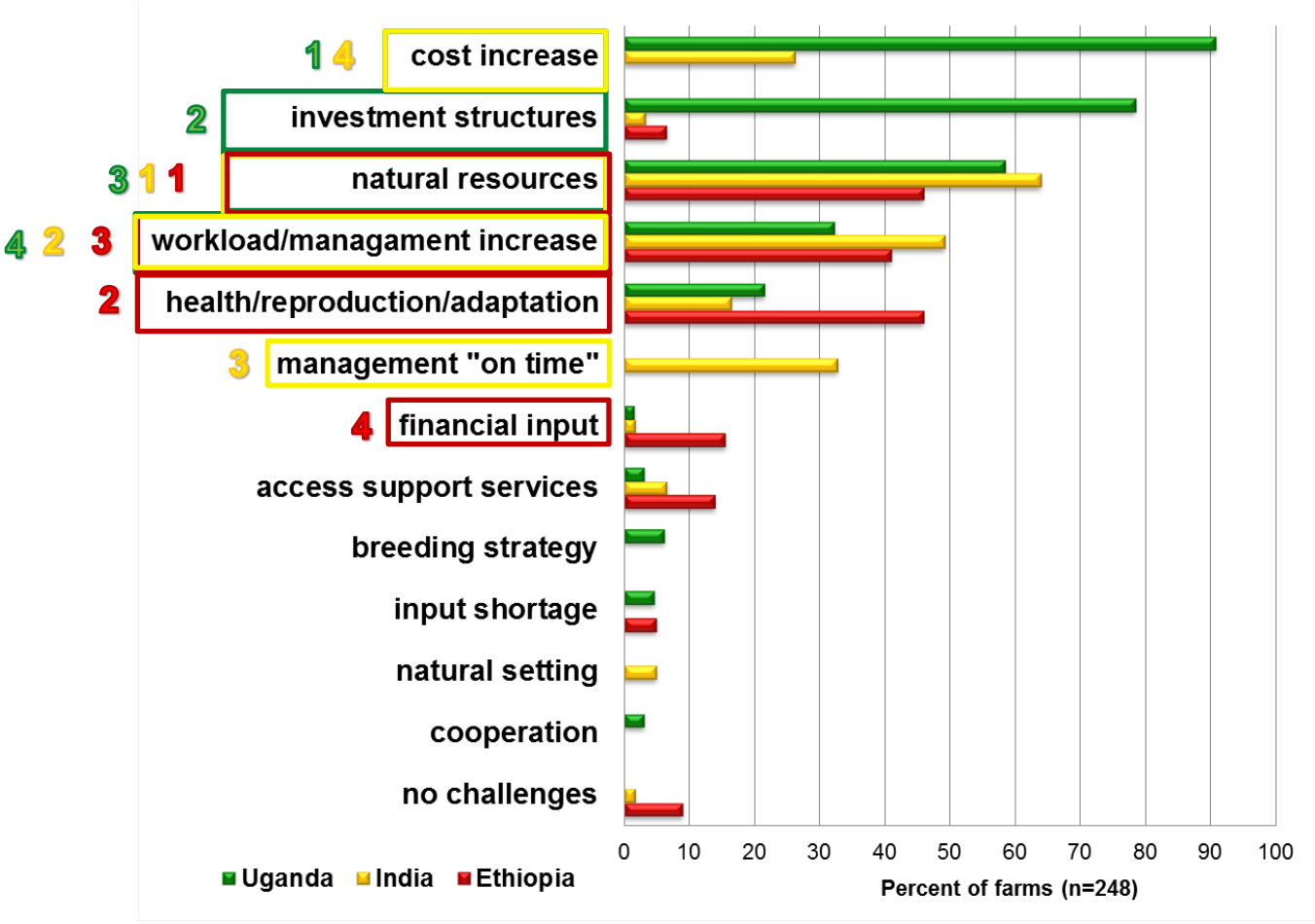

We conclude...

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- initiators conform with local context
- fellow farmers important
- motivation: income increase
- link information source ” crossbred animal source
- breeding adaptation
  - reason : context specific
  - **if** alternatives **available**
  - increase milk yield by upgrading: lack knowledge optimal level (e.g. Syrstad, 1996)

We conclude...

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- perceptions of performance/health fit prior experiences in tropical settings
- substantial production system change
- challenges: highly context specific
  - natural resources → environmental sustainability?
  - increased workload

Sustainable crossbreeding?

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high input

- manpower
- investment
- resources
- animal health care
- management

high output

- income increase
- employment creation
- milk market access
- livelihood improvement

- farmers recommend crossbreeding
- enviromental impact
- **resources, markets** and **support system** crucial for success

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Thank you very much for your attention!!

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pictures & figures

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  - slide 2: graph FAO, 2009 (see reference list)
  - slide 3: Table from McDowell, 1985 (see reference list)
  - images slide 4 and 5: © ILRI 2010 Presentation Alan Duncan, ILRI Annual Program Meeting, Addis Ababa, 15 April 2010. Retrieved from: http://de.slideshare.net/ILRI/ilri-annual-program-meeting-2010.

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  - All maps from googlemaps.com
  - Location maps on globe: wikipedia.com

Results – Herd size change details

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